13875

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	22 April 2003	Conference Paper

4. TITLE AND SUBTITLE
A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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Warren, MI 48397-5000

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
13875

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION AVAILABILITY STATEMENT
Unlimited

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Field tests to compare camouflage patterns rely on collecting data on the preferences of human observers. The director of such tests has been faced with a choice between using pencil-and-paper ballots or using an expensive data collection system based on push buttons wired to personal computers with custom software. In this paper we describe an alternative system that combines the advantages of digital collection with the simplicity of paper ballots. The key ingredients to the system are personal data assistants (PDA's) and database software that runs on a PDA. Specifically, our system makes use of Palm Pilots and the commercial database program thinkDB. Using a stylus, each observer enters his selection of the better camouflage pattern by pushing a radio button on the screen of his Palm Pilot. At the end of the test, the test director uses the Palm HotSync function to transfer the results to a personal computer for analysis.

14. SUBJECT TERMS
data collection, visual tests, personal data assistants, human observers

15. NUMBER OF PAGES
7

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	

draft

13875

OPSEC REVIEW CERTIFICATION

(AR 530-1, Operations Security)

I am aware that there is foreign intelligence interest in open source publications. I have sufficient technical expertise in the subject matter of this paper to make a determination that the net benefit of this public release outweighs any potential damage.

Reviewer: Dr. Douglas W. Templeton GS-15 TL Emerging Tech

Name Grade Title

Douglas W. Templeton 17 Mar 03

Signature Date

Description of Information Reviewed:

Title: A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants

Author/Originator(s): John Bennett and James Crile

Publication/Presentation/Release Date: April 2003

Purpose of Release: SPIE Conference

An abstract, summary, or copy of the information reviewed is available for review.

Reviewer's Determination (check one)

(1) Unclassified Unlimited.

2. Unclassified Limited, Dissemination Restrictions IAW _____

3. Classified. Cannot be released, and requires classification and control at the level of _____

Security Office (AMSTA-CM-XS):

(Concur)/Nonconcur [signature] 18 Mar 03

Signature Date

Public Affairs Office (AMSTA-CM-PI):

(Concur)/Nonconcur Margaret Compton March 29, 2003

Signature Date

STA 7114-E

A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants

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ABSTRACT

Field tests to compare camouflage patterns rely on collecting data on the preferences of human observers. The director of such tests has been faced with a choice between using pencil-and-paper ballots or using an expensive data collection system based on push buttons wired to personal computers with custom software. In this paper we describe an alternative system that combines the advantages of digital collection with the simplicity of paper ballots. The key ingredients to the system are personal data assistants (PDA's) and database software that runs on a PDA. Specifically, our system makes use of Palm Pilots and the commercial database program thinkDB. Using a stylus, each observer enters his selection of the better camouflage pattern by pushing a radio button on the screen of his Palm Pilot. At the end of the test, the test director uses the Palm HotSync function to transfer the results to a personal computer for analysis.

INTRODUCTION

Data collection is a major portion of comparing camouflage patterns during field tests. Yet, when discussing the method of data collection, we tend to present ourselves with a false dichotomy: Should we use pencil and paper or a very expensive data collection system? However, we reject this false dichotomy and propose a different system using personal data assistants (PDA's) and commercial database software. It has the simplicity of paper ballots while retaining many of the benefits of digital collection systems. We will describe our system in some detail and then present a brief evaluation of the method in practice.

THE EXPERIMENTAL SETUP

Figure 1 illustrates a typical setup to perform an experiment on observer preferences. For each test run, we present to the observers two test objects, for example, two vehicles with different paint patterns. Each observer decides independently which test object looks better and records the decision. Later, we analyze the recorded data to understand the performance of the test objects.

THE DATA COLLECTION SYSTEM

This section will describe both the components needed to implement our data collection method and the data collection method itself. Upon the completion of this portion, one should have a relatively good idea concerning how to begin implementing such a system. The key components of our method are PDA's and commercial database software. In this section, we will briefly describe each of these components.

PDA's

The first component of our method is the PDA. A personal data assistant is a touch-screen computer that fits in the palm of one's hand. It comes with a pencil-like object called a stylus that is used for writing and clicking. In other words, the stylus takes the place of both the keyboard and mouse of a conventional desktop computer. However, there is more to a PDA than simply a touch-screen and stylus. Some of the most common applications for PDAs are calendars and phone books. A PDA can be used when away from a desktop computer and then later synchronized with the desktop computer. This process of synchronization adds to the power of the PDA for our purposes.

Figure 2 shows one of the particular PDA's that we used. We purchased Palm M100 PDA's for several reasons. First, they run the Palm operating system, for which a wide range of third party software is available. Second, their screens are readable in bright daylight. Third, a suitable database program was available for the M100. And, finally, at $89 each, the M100 was cheap enough for us to purchase a PDA for each of 24 observers.

Commercial Database Software

The second component of our system is commercial database software. Each Palm M100 included the Palm version of thinkDB, a commercial database program. In addition, we purchased purchase 2 copies of the desktop PC version of thinkDB. With thinkDB, one can design custom forms using drop-down lists, radio buttons, text fields, and so forth. Through interaction with these forms, records are created in a database table. The next section describes this process in detail.

THE METHOD

In this section, we will first describe how to use thinkDB to design a table and form using a desktop computer. Then, we will show how the database operates on the PDA itself. Finally, we will illustrate how the PDA synchronizes with the desktop computer.

Designing a Table and Form Using ThinkDB

We will now describe how to use thinkDB to design a table and form. Upon opening thinkDB, designing a table is very straightforward. We simply right-click and select *field properties*. From here, we can choose options such as field name, type, default value, and so on as in Figure 3.

As we can see, we chose a float field named myField with a default value of 3.02. Therefore, when we add new records, the default values will automatically be displayed with the default values (if any) as in Figure 3 below:
The default value of 3.02 for myField appears just as we specified. Similarly, "John" is the default value for the name field.

From here, we simply click on Tools->Form Designer. We just drag and drop the field right on the form, and we have a form for the PDA in a matter of minutes. Our completed form looks like Figure 4.

Now that we have seen how to design a table and form, let us move on to show how forms look on the PDA itself.

ThinkDB on the PDA

There are basically two views of thinkDB on the PDA: the record list view and the data entry view. The record list view can be seen in Figure 5. As we can see, each record is in the list. To create a new record using a stylus, the user simply needs to click on the blank sheet of paper in the icon bar next to the little house in the corner. Then, he is

presented with a record filled with only default values. For example, a given data entry screen for one record might look something like Figure 6.

In Figure 6, there are many different types data fields. To name a few, we see "date", "drop-down list", "text", and "checkbox" as various types. After clicking okay, a new record is created, and it automatically shows up in the record list view mode.

Synchronizing the PDA with the Desktop

Uploading the data from the PDA to the desktop is very easy. We simply connect desktop to the PDA, Figure 3, and push the HotSync button on the connecting cable. In a matter of seconds, the database table on the desktop contains all the data from the PDA. From here, the table can easily be exported to a text file. The text file can then be imported into a program such as Microsoft Access for data reduction.

EVALUATION OF THE METHOD

This method of data collection worked rather well. Pencil and paper just tend to add to the monotony of field tests. However, with our method, many observers unfamiliar with handheld technology got to use it. It therefore has the side benefit of handheld training in addition to being a relief for observers. Furthermore, we reduced the data reduction time by no small measure.

On the other hand, there are some drawbacks. We learned quickly that PDAs tend to slow down almost to the point of not working at all when left in the sun during breaks between runs. However, this was minor since the observers just started placing them in shaded areas. On the plus side, surprisingly, we did not lose any data from dropped PDAs.

CONCLUSION

From our experience, the data collection system presented in this paper worked very well. Using PDAs with database software presents a step up from pencil and paper and an economical alternative to expensive data collection systems. We plan to continue using the system for data collection

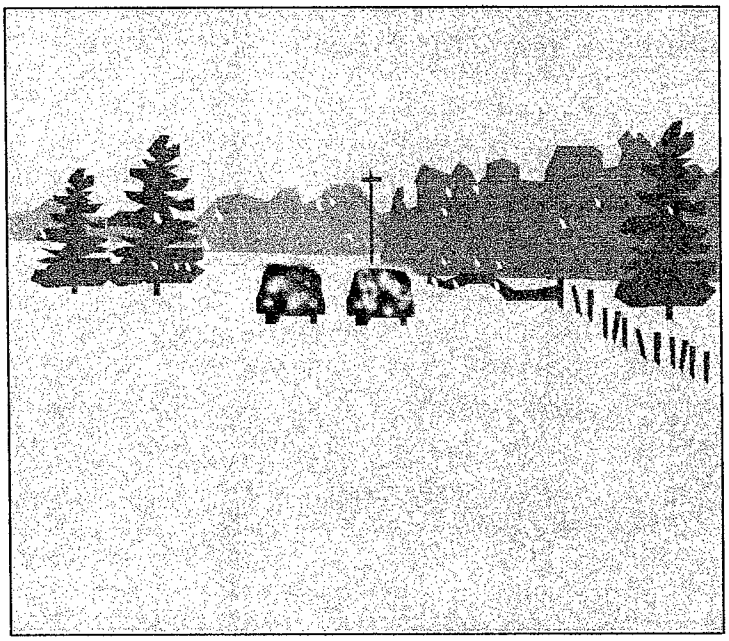

Figure 1. Experimental setup for a preference test.

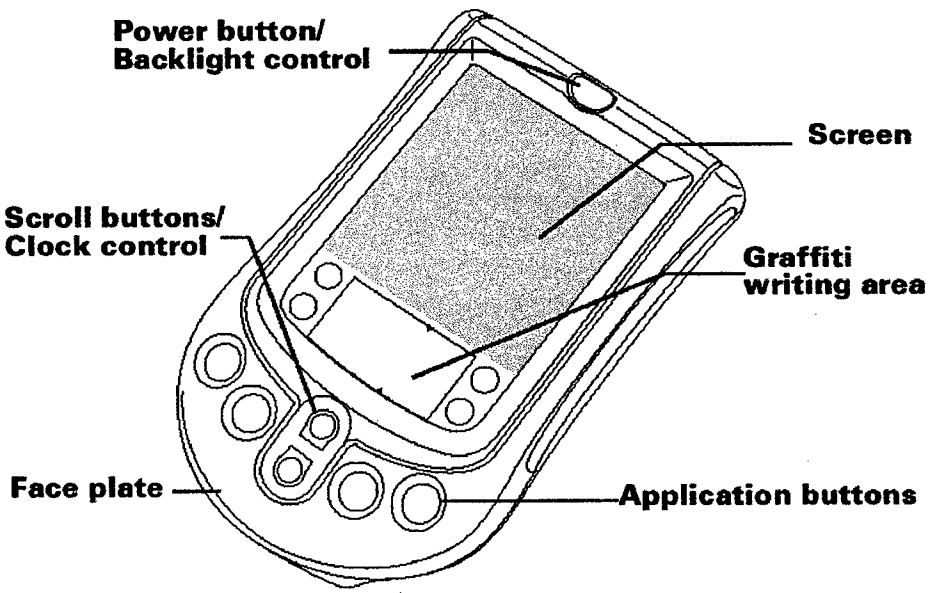

Figure 2. A Palm M100 PDA.

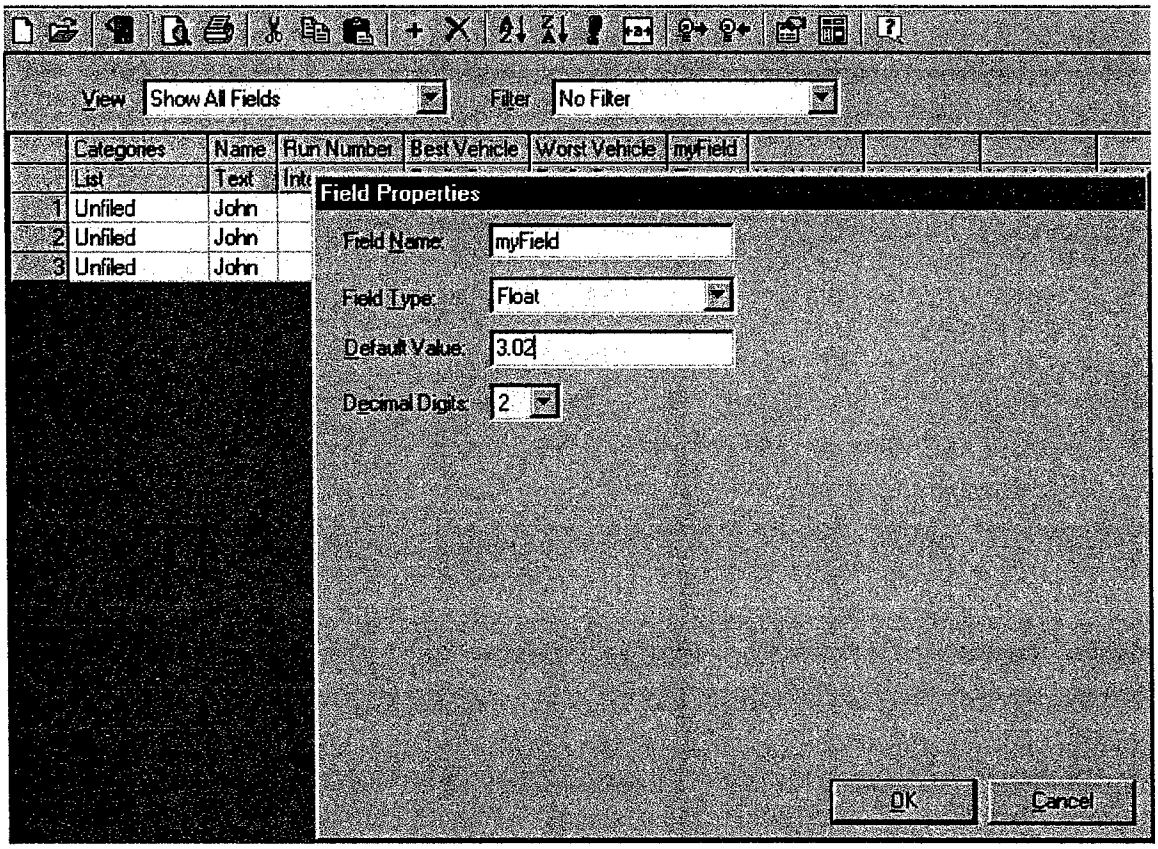

Figure 3. Creating fields in thinkDB

	Name	Run Number	Best Vehicle	Worst Vehicle	myField
	Text	Integer	Radio Button	Radio Button	Float
1	John	101	3	2	3.02
2	John	102	1	4	3.02
3	John				3.02

Figure 4. A sample record showing default values

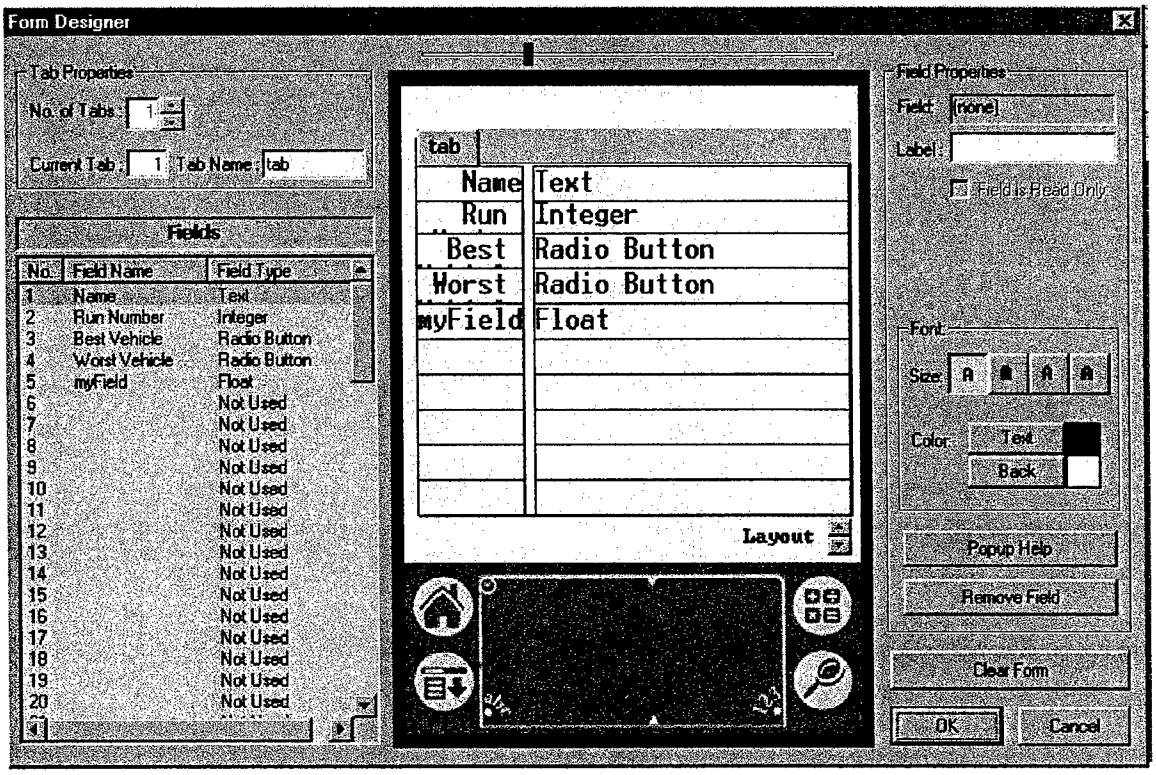

Figure 5. ThinkDB drag and drop form designer

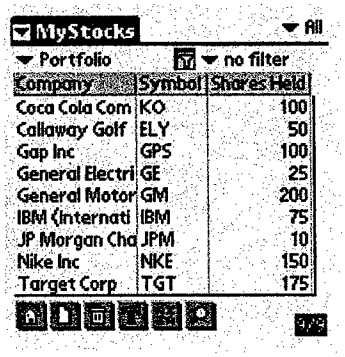

Figure 6. A sample table in record list view mode

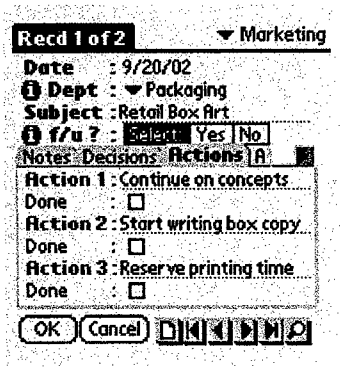

Figure 7. A sample table in data entry mode

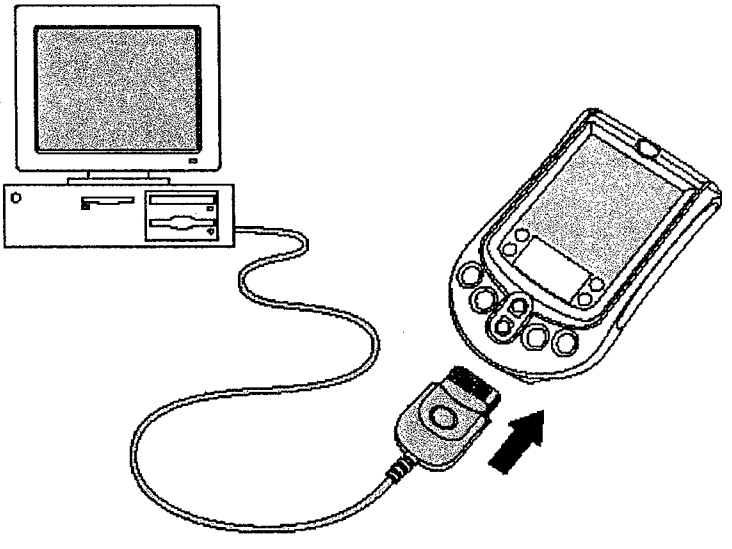

Figure 8. PDA to desktop PC connection.